CLAIMS

What is claimed is:

1. An NDO or NDO related complex comprising a plurality of polypeptides, wherein the complex comprises at least one alpha-subunit polypeptide that comprises: 1) a substituted amino acid at the position corresponding to position 352 in NDO, 2) a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO, or 3) a substituted amino acid at the position corresponding to position 352 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

2. The NDO complex of claim 1 having an alpha-subunit that comprises an amino acid other than phenylalanine at position 352, or a catalytically active fragment thereof.

3. The NDO complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at position 201, 202, 260, 316, 351, 352, 358, 362, or 366 or a catalytically active fragment thereof.

4. The NDO complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 352 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

5. The NDO related complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 352 in NDO; or a catalytically active fragment thereof.

6. The NDO related complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 201,

202, 260, 316, 351, 352, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

7. The NDO related complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 352 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

8. The complex of claim 2 wherein the amino acid at position 352 is a naturally occurring amino acid.

9. The complex of claim 2 wherein the alpha-subunit has or comprises SEQ ID NO:2, 32, 33, 34, 35, or 36.

10. The complex of claim 2 wherein the alpha-subunit has or comprises SEQ ID NO:2.

11. The complex of claim 5 wherein the amino acid at the position corresponding to position 352 in NDO has been substituted with a naturally occurring amino acid.

12. The complex of claim 5 wherein the amino acid at the position corresponding to position 352 in NDO has been substituted with valine.

13. The complex of claim 5 wherein the alpha-subunit has or comprises any one of SEQ ID No's:14 to 24.

14. An isolated and purified DNA segment comprising a DNA-sequence encoding the polypeptide of any one of claims 1 to 13.

15. An expression cassette comprising a promotor operably linked to the DNA segment of claim 14.

16. A host cell, the genome of which is augmented by the DNA segment of claim 14.

17. A method to produce a catalytically active polypeptide comprising culturing a host cell transformed with the DNA segment of claim 14 so that the host cell expresses the DNA segment.

18. A method for preparing (-)-(1*S*,2*R*)-*cis*-naphthalene dihydrodiol comprising contacting naphthalene with the complex of any one of claims 1 to 13.

19. A method for preparing (-)-(1*S*,2*R*)-*cis*-naphthalene dihydrodiol comprising contacting a host cell of claim 16 with naphthalene.

20. A method for preparing (- or +)-*cis*-biphenyl-3,4-dihydrodiol comprising contacting biphenyl with the complex of any one of claims 1 to 13.

21. A method for preparing (- or +)-*cis*-biphenyl-3,4-dihydrodiol comprising contacting a host cell of claim 16 with biphenyl.

22. A method for preparing (1S,2R)-*cis*-phenanthrene-1,2-dihydrodiol comprising contacting phenanthrene with the complex of any one of claims 1 to 13.

23. A method for preparing (1S,2R)-*cis*-phenanthrene-1,2-dihydrodiol comprising contacting a host cell of claims 16 with phenanthrene.

24. A method to oxidize an aromatic compound to a corresponding dihydrodihydroxy compound comprising contacting the aromatic compound with the complex of any one of claims 1 to 13.

25. A method to oxidize an aromatic compound to a corresponding dihydrodihydroxy compound comprising contacting the aromatic compound with a host cell of claim 16.

26. The method of claim 24 or 25 wherein the aromatic compound is indene, 1,2-dihydronaphthalene, benzocyclohept-1-ene, anthracene, phenanthrene, dibenzo[1,4]dioxan, acenaphthylene, naphthalene, biphenyl, fluorene, dibenzofuran, dibenzothiophene, 9,10-dihydroanthracene, or 9,10-dihydrophenanthrene.

27. A method to prepare *cis*-1,2-dihydroxyindan comprising contacting indene with the complex of any one of claims 1 to 13, or with a host cell of claim 16.

28. A method to prepare 1,2-dihydroxy-1,2,3,4-tetrahydronaphthalene comprising contacting 1,2-dihydronaphthalene with the complex of any one of claims 1 to 13, or with a host cell of claim 16.

29. A method to prepare 1,2-dihydroxy-1,2-dihydrophenanthrene or 3,4-dihydroxy-3,4-dihydrophenanthrene comprising contacting phenanthrene with the complex of any one of claims 1 to 13,or with a host cell of claim 16.

30. The NDO complex of claim 3 having an alpha-subunit that comprises alanine, glutamine, or serine at position 201.

31. The NDO complex of claim 3 having an alpha-subunit that comprises leucine or valine at position 202.

32. The NDO complex of claim 3 having an alpha-subunit that comprises alanine, leucine, or asparagine at position 260.

33. The NDO complex of claim 3 having an alpha-subunit that comprises alanine at position 316.

34. The NDO complex of claim 3 having an alpha-subunit that comprises asparagine, arginine, or serine at position 351.

35. The NDO complex of claim 3 having an alpha-subunit that comprises alanine at position 358.

36. The NDO complex of claim 3 having an alpha-subunit that comprises alanine at position 362.

37. The NDO complex of claim 3 having an alpha-subunit that comprises tryptophane at position 366.

38. A oligonucleotide comprising any one of SEQ ID No's 37 and 40-55.